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two kingdoms at the memorable period when the French Fleet lay so long in Bantry bay, the capture of that fleet by the British Navy, must have been inevitable, as the wind was perfectly favourable during the whole of the time, for British ships to sail from Plymouth, and other English ports, though so adverse to vessels passing from Ireland, that it was above a fortnight from the time, when the French fleet first entered the bay, before an account of the event was conveyed to the British Government.

On the spontaneous ignition of Charcoal, by M.B.G. Sage, director of School of Mines in France.

Journal de Physique, tom. 55, *F.* 423.

M. de Causigni, appears to be the first who observed that charcoal was capable of being set on fire by the pressure of millstones.

M. Robin, commissary of the powder mills of Essonne, has given an account in the Annales de Chemie, No. 35, F. 93, of the spontaneous inflammation of charcoal, from the black-berry bearing alder, that took place the 23d of May 1801, in the box of the bolter, into which it had been sifted; this charcoal made two days before, had been ground in the mill without showing any signs of ignition. The coarse powder that remained in the bolter experienced no alteration. The light undulating flame, unextinguishable by water, that appeared on the surface of the sifted charcoal, was of the nature of Hydrogen gas, which is equally unextinguishable.

The moisture of the atmosphere, of which fresh made charcoal is very greedy, appears to me to have concurred in the developement of the inflammable gas, and the combustion of the charcoal.

It has been observed that charcoal powdered and laid in large heaps, heats strongly.

Alder charcoal has been seen to take fire in the ware-houses, in which it has been stored.

About thirty years ago, I saw the roof of one of the low wings of the mint set on fire by the spontaneous combustion of a large quantity of charcoal, that had been laid in the garrets.

M. Malet, commissary of gunpowder at Poutailler, near Dion, has seen charcoal take fire under the pestle; he also found that when pieces of saltpetre and brimstone were put into the charcoal mortar, the explosion took place between the fifth and sixth strokes of the pestle. The weight of the pestles is 80 pounds each, half of this belonging to the rounded ferule of bell metal, in which each one terminates.

The pestles are raised only one foot, and make 45 strokes in a minute.

In consequence of the precaution now taken, to pound the charcoal, brimstone, and salt-petre separately, no explosions take place, and time is gained in the fabrication, since the paste is made in eight hours, that formerly required twenty-four.

Every wooden mortar contains twenty pounds of the mixture, to which two pounds of water are added gradually.

The paste is first corned; it is then glazed, that is, the corns are rounded, by subjecting them to the rotary motion of a barrel, through which an axis passes: and lastly, it is dried in the sun, or in a kind of stove.

Experience has shewn, that brimstone is not essential to the preparation of gun-powder; but that which is made without it falls to powder in the air, and will not bear carriage.

There is reason to believe that the brimstone forms a coat on the surface of the powder, and prevents the charcoal from attracting the moisture of the air.

The goodness of the powder depends on the excellence of the charcoal; and there is but one mode of obtaining this in perfection, which is by distillation in close vessels, as practised by the English.

The charcoal of the French manufactories is at present prepared in pots, where the wood receives the immediate action of the air, which occasions the charcoal to undergo a peculiar alteration.

Observation. The many dreadful accidents which have happened from explosions in the preparation of gunpowder, renders it a point of humanity to make every circumstance that can tend to excite them, as public as possible. That which forms the subject of this paper, is as yet known to very few, and perhaps may have been the cause of the loss of many useful members of society, without being suspected.

Theory of the Detonation and Explosion of Gunpowder. By the author of the former paper.

Journal de Physique, tom. 55.

These two phenomena, which take place at the same instant, arise from different causes. The detonation is the noise that is produced by the combination of two parts of inflammable air, and one of oxygen gas.

The explosion, or discharge, is produced by the water of the nitre, and that which results from the decomposition of the two gasses, which being expanded by the fire, occupies fourteen thousand times the space it did before; and acts in the same manner as compressed air, to which its elasticity is restored, and the explosive effect of which is produced without detonation.

The inflammation of gunpowder by means of a spark, arises from the ignition of the nitre and brimstone.

The inflammable gas is produced by the decomposition of the charcoal; and the oxygen gas arises from part of the nitre, which is decomposed by the fire.

After the explosion of gunpowder, we find the inside of the gun-barrel coated with a mixture of alkaline sulphuret and charcoal not decomposed. This alkaline mixture attracts the moisture of the air, and forms a greasy coating within the barrel; and on dsicharging the piece, it kindles, and produces what is termed hanging fire. The barrel of a fowling-piece, therefore, should never be used a second day without cleaning.

Observations. The approach of the shooting season will render the contents of this paper interesting to many readers of the Magazine. The caution at the end will be found very useful, and may prevent many bad accidents.

Description of a process by which Potash and Soda may be metalized without the assistance of iron. By M. F. R. Curaudau.

Journal de Physique, Ap. 1808.

If, according to the process of Mr. Davy, potash and soda be metallic oxides, is it not more probable, that the prussic calcinations are simply the combination of this metal with charcoal? Such at least was my opinion, at the time of making my experiments, and it will appear now far it was well-founded, since I have accomplished the metallization of potash and of soda, by heating strongly the alkali with charcoal, a process which it is obvious ranks among the Prussic calcinations.

The metallization of potash or soda takes place with either of the two following mixtures, which succeed as well in stone retorts as in iron tubes; the first or second process may be employed indifferently. I prefer iron vessels, however, because they are more permeable to caloric, and less subject to fusion than the stone ware, particularly when the latter is penetrated with alkali; an inconvenience that prevents the operation from being continued to the end, which does not happen so frequently with iron.

Process the first.

Mix intimately four parts of animal charcoal, well powdered, with three of carbonate of soda, dried on the fire, without having been fused, and mix the whole with a sufficient quantity of linseed oil, but not so as to form a paste.

Process the second.

Take two parts of flour, and mix them intimately with one part of soda, prepared as in the preceding process, and add to this mixture as much linseed oil as it will bear without ceasing to be pulverulent.

Whatever be the kind of vessel employed to calcine this matter, and whether it be the first or second mixture, we must always begin with heating it gradually; but as soon as the matter is obscurely red, the fire may be increased, till a fine sky-blue light, surrounded with a greenish aureola, is perceived in the interior of the retort or iron tube. To this light will soon succeed a very copious vapour, which obscures all the interior of the vessel. This is the metal which is disengaged from the mixture. The fire must then be urged no farther, for at this temperature the retort begins to fuse; and if the iron resists better, it is because